AS 3595—1990

Australian Standard®

Energy management programs—Guidelines for financial evaluation of a project

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Association of Consulting Engineers, Australia

Australian Construction Services, Department of Administrative Services

Australian Gas Association

Australian Institute of Energy

Australian Institute of Petroleum

Australian Institute of Refrigeration, Air Conditioning and Heating

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Department of Minerals and Energy, New South Wales

Department of Mines and Energy, South Australia

Department of Primary Industries and Energy

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PREFACE

This Standard was prepared by the Standards Australia Committee on Energy Auditing, as one of a suite of Standards being produced following a request, on behalf of the Australian Minerals and Energy Council's Co–ordinating Committee on Energy Management, from the former Department of Resources and Energy (now the Department of Primary Industries and Energy) to assist in the National Energy Conservation Program. The first of the suite, AS 2725, *Guidelines for reporting energy use as part of the energy audit*, was published in 1984, and others are in course of preparation.

This Standard sets out guidelines for the financial evaluation, using discounted cash flow methods, of options identified for detailed study in a typical energy management program.

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FOREWORD

This Standard recommends life-cycle costing as the appropriate methodology for determining the most cost-effective energy solution. Within the life-cycle cost concept there are various levels of sophistication and accounting for the variables involved, ranging from a simple payback period to net present cost for a project; and several formats for expressing the benefits. Expressions to compute these factors require a number of assumptions including the future values of the discount rate and the energy price escalation rate. These matters are considered in this Standard.

'Life-cycle cost' means the total cost of installing, owning, operating and maintaining a process, an activity or a building over its useful life. This Standard gives details of how to compute only the energy component of the life-cycle cost. Cost categories other than energy are identified and the user would be expected to allow for them using consistent methodology which, based on 'life-cycle cost', enables an investment to be evaluated in terms of its net present cost.

This Standard proposes comparisons of different investment options on the basis of their net present cost, because this is the most reliable criterion and is applicable in all circumstances covered by this Standard. The internal rate of return method is not recommended in this Standard because it is potentially misleading in many instances and does not necessarily provide a single solution.

For financial evaluation of an energy management project involving comparison of different proposals in which the lifetimes are unequal, three options in present value analysis are available —

(a) to make the evaluation over the lowest common multiple of individual lifetimes;

(b) to choose the shortest individual lifetime and assess the residual value of the longer lifetime proposals after that time; and

(c) to choose the longest lifetime and, for the shorter life options, choose a replacement procedure based on the cost of the initial choice for that option.

The use of the methodology in this Standard will bring uniformity in the procedures at present used for evaluation of energy management programs and will ensure that some factors which are currently overlooked will be recognized and taken into account. It is acknowledged that non-financial factors can also influence investment within an energy management program; indeed these can sometimes assume an overriding importance. Note that taxation has not been recognized in the cost of funds in this Standard.

STANDARDS AUSTRALIA

Australian Standard
Energy management programs—Guidelines for financial evaluation of a project

1 SCOPE. This Standard sets out guidelines for financial evaluation of a project within an energy management program and describes the recommended methodology and procedures to permit an evaluation of the cost-effectiveness of competing options.

NOTE: Examples illustrating the use of this Standard are given in Appendix A.

2 OBJECTIVES. In support of the selection of a plan of action (see AS 2725), the objectives of this Standard are—

(a) to bring a degree of uniformity to the procedures for financial evaluation of energy management projects; and

(b) to permit an evaluation of the cost-effectiveness of competing energy management options.

3 APPLICATION. This Standard applies to the procedures for financial evaluation of energy management projects in institutional, governmental, commercial, and industrial applications.

4 REFERENCED DOCUMENTS The documents below are referred to in this Standard.

AS

2002 Solar water heaters—Installation

2725 Guidelines for reporting energy use as part of the energy audit

5 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 2725 and those below apply.

5.1 Base period—the period in which an investment is made at the commencement of an energy management program. By convention, base period is referred to as 'period zero'.

5.2 Capital—fixed items of expenditure, such as machinery, buildings, land, etc, spent or invested with the objective of producing an income.

5.3 Capital investment—amount of money proposed to be spent in the base period, to achieve an objective involving expenditure on energy.

NOTES:

1. For an energy management project, capital investment is the total cost of putting a facility into service, including, e.g. costs of engineering design, civil engineering, foundations and dedicated building works, purchase, delivery and installation of mechanical and electrical plant, and commissioning and start-up.
2. Capital investment is represented in an evaluation by the total expenditure brought to account in the base period.

Other (non-preferred) terms:

Capital expenditure

Investment cost

Capital cost

5.4 Discount—the difference in current dollars, between the value of a negotiable instrument (promissory note, sales contract, bill of exchange, etc), presented for payment at some time, and the value of the same instrument presented at an earlier point in time. It represents the time value of money.

5.5 Discounting—the process of applying a discount.

5.6 Discount rate (r)—the rate of growth or decay of funds over a period of time, as an expression of the effect of the time value of money. It is expressed as a fractional or percentage rate, per unit of time, averaged over the interval of concern, i.e. the discount of 1 unit of principal for 1 unit of time.

NOTE: The discount rate is generally a measure of the cost of funds to the investor, e.g. the interest paid on borrowed funds, forgone on own funds expended, or the potential income in the form of interest and/or dividends if the funds were to be invested in the best possible alternative to the project under consideration.

The discount rate appears in evaluation calculations as the discount multiplier $(1 + r)$, where r is a fraction.

5.7 Escalation rate (a)—the rate of growth of an item of cost over a period of time, as an expression of currency inflation or other commodity market forces. It is expressed as a fractional or percentage rate, per unit of time, averaged over the interval of concern.

NOTES:

1. The rate selected for use in the evaluation in respect of energy costs, must be compatible with the size of purchases of energy.
2. The escalation rate appears in evaluation calculations as the escalation multiplier $(1 + a)$, where a is a fraction.
3. When an evaluation is made in nominal terms, it should be noted that both the escalation rate and the discount rate will normally be different from those selected to evaluate the same data in real terms. The relativity to each other of the options considered, appearing as the end result of an evaluation in either nominal or real terms, (provided it has been made consistently), should be identical. Users unfamiliar with Discounted Cash Flow concepts may benefit from discussions with an accountant or economist experienced in the field.

5.8 Escalation ratio (d)—ratio of escalation multiplier to discount multiplier, i.e. $d = (1 + a)/(1 + r)$.

5.9 Evaluation in nominal terms—refers to an evaluation in which costs are expressed in actual dollars expended at the time. Sometimes referred to as 'current terms', or 'out-turn dollars'.

5.10 Evaluation in real terms—refers to an evaluation in which costs, the discount rate and escalation rates are referred to a specified time point datum; i.e. in which the effects of inflation have been removed by expressing all costs in constant value dollars. Real terms are sometimes referred to as 'constant terms'.